

UNION CARBIDE CORPORATION (UCC)  
Union Carbide Remediation Group (UCRG)  
3301-5 Avenue South (P O Box 471)  
Building 88 Room 24  
Texas City, Texas 77592-0471

(409) 948-5226  
(409) 948-5339 Fax



**MEMORANDUM**

14 October 1994

**CERTIFIED MAIL RETURN RECEIPT REQUEST No. P319085962**

Mr. Paul S. Lewis, Manager (512) 239-2340 (512) 239-2346 Fax  
Corrective Action Section  
Industrial and Hazardous Waste Division  
Texas Natural Resource Conservation Commission (TNRCC)  
1700 North Congress  
Stephen F Austin Building  
P O Box 13087, Capitol Station  
Austin, Texas 78711-3087

**SUBJECT: SWMU Z "OLD OIL SKIMMER PITS";  
REVISED CORRECTIVE MEASURE IMPLEMENTATION REPORT**

**REF:** Letter to R E O'Bryan (UCC) from P S Lewis (TNRCC-Austin, TX) dated 19 SEP 94  
[Corrective Measure Implementation Report for SWMU Z]

UCC SOLVENTS AND COATINGS MATERIALS DIVISION  
BROWNSVILLE, TX FACILITY (210) 831-4501 (210) 831-5278 Fax  
STAR ROUTE BOX 90 (2.5 miles east of Highway 511 on Highway 48)  
BROWNSVILLE, TX 78521

TNRCC PERMIT No. HW-50318  
TNRCC SOLID WASTE REGISTRATION No. 31108  
EPA ID No. TXD008114092

Dear Mr. Lewis:

Per attached referenced letter, enclosed are two sets of the SWMU Z Revised Corrective Measure Implementation (CMI) Report for Risk Reduction Rules (R<sup>3</sup>) Standard 2 closure. An additional set is being sent to TNRCC - District 15 office.

UCC has addressed the three issues enumerated in attached referenced letter by providing corrections and additional information within the enclosed subject revised CMI report. A summary of the corrections / additional information is provided below.


1. The groundwater laboratory results from Monitor Well MW-7692-2 displayed a total dissolved solid (TDS) concentration of 0.0024 parts per million (ppm). This result was in error; the original laboratory data reported a result of 24,000 milligrams per liter (i.e., ppm). Corrected analytical sheets have replaced the erroneous sheets as provided in Appendix C.
2. Total petroleum hydrocarbons (TPH) were left in place in the east sidewall excavation since analysis of specific Appendix IX constituents of TPH (i.e., polycyclic aromatic hydrocarbons, volatile aromatic hydrocarbons and phenol) showed all parameters to be below Standard 1 or Standard 2 R<sup>3</sup> Closure Criteria. [For your information, attached is the Standard Operating Procedure for TPH by Gas Chromatography - Mass Spectrometry.] These results are discussed in detail in Section 4.2 of subject enclosed report. Summary Table 4-1 was revised to reflect all constituent analyses. Also, corrected Figures 1-3 and 4-1 have replaced the previously issued erroneous figures.

3. Site specific background concentrations for metals were calculated by constructing a tolerance interval from background samples. Table 1-2 in Section 1-1 reports the results of these calculations.

Based on the data presented in the enclosed subject revised CMI report and the original data presented in the RCRA Facility Investigation Plan dated 30 JUL 93, UCC has demonstrated that SWMU Z met the criteria for R<sup>3</sup> Standard 2 and can be closed with no further action. The facility's land owner, Brownsville Navigation District (BND), will deed record (refer to Appendix E) this area in the Cameron County deed records within 90 days of TNRCC acceptance of this report.

The BND have expressed a need for obtaining TNRCC clearance expeditiously so as to proceed with leasing to potential business(es). Therefore, your timely review of subject document as well as previously submitted documents concerning this site will be greatly appreciated. If you should require any additional information, please feel free to contact me at (409) 948-5226.

Sincerely,



Robert E. O'Bryan\*

Brownsville, TX; Torrance, CA; and Sunnyvale, CA Sites Remediation Program Manager

cc:	G M Alsop - 511*	C J Kruse - BND*
	B P Basile - ENSR Houston, TX**	T Larson - TNRCC Austin, TX***
	C S Colman - 500**	D K Ramsden - ENSR Houston, TX*
	H W B Estes - ENSR Houston, TX*	S I Shah - 511**
	T Franco - TNRCC15 Harlingen, TX*	M E Tapp - 803**
	B Gallagher - EPA VI Dallas, TX***	Location 526 File*

\* complete report  
\*\* cover letter, executive summary, Sections 1 - 7 only  
\*\*\* cover letter only

reo28:bv349

John Hall, Chairman  
Pam Reed, Commissioner  
Peggy Garner, Commissioner  
Anthony Grigsby, Executive Director



## TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

*Protecting Texas by Reducing and Preventing Pollution*

September 19, 1994

**CERTIFIED MAIL**  
**RETURN RECEIPT REQUESTED**

Mr. Robert E. O'Bryan  
Site Remediation Coordinator  
Union Carbide Corporation - Brownsville  
P. O. Box 471  
3301-5 Avenue South  
Texas City, Texas 77592-0471

Re: Corrective Measure Implementation Report for SWMU Z  
Union Carbide Corporation - Brownsville  
ISW Reg No. 31108  
Hazardous Waste Permit No. HW-50318  
EPA I.D. No. TXD008114092

RECEIVED

SEP 23 1994

REO'B

Dear Mr. O'Bryan:

The Texas Natural Resource Conservation Commission (TNRCC) has received and reviewed Union Carbide Corporation's (UCC's) submittal dated June 10, 1994. The TNRCC's evaluation of the report indicates that a No Further Action (NFA) request for solid waste management unit (SWMU) Z is not warranted at this time. The TNRCC staff provides the following reasons.

1. Ground-water lab results from monitor well MW-7692-2 displayed a total dissolve solid (TDS) concentration of .0024 ppm. for SWMU Z. UCC used a caveat in the Risk Reduction Rules (RRR) which allows facilities to multiply ground-water protection concentrations by one hundred if the ground-water TDS concentration is above 10,000 ppm. Please explain the use of the RRR multiplier when TDS concentration appears to be below the required TDS value.
2. It appears that UCC has failed to define the horizontal extent of total petroleum hydrocarbon (TPH) contamination for the east sidewall of SWMU Z. Since UCC did not establish background concentration for TPH, the TNRCC staff must rely on method detection limit (MDL) for extent determination. Based on MDLs in Table 4-1 for TPH, the staff believes that results from the east sidewall verification samples indicate that UCC's soil excavation program didn't remove all of the TPH. However, in point three (3) of the TNRCC's letter dated August 18, 1994 to UCC, the staff discussed the Corrective Action Team's current practice for TPH. It is suggested that UCC review that point for available options.

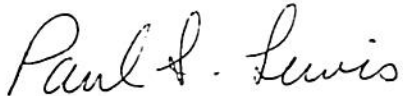
Mr. O'Bryan  
Union Carbide Corporation  
Page 2

3. In the referenced August 18, 1994 letter, the TNRCC briefly discussed site specific background concentration. Please calculate and report all background concentrations for the facility. UCC should produce and submit a background table for all parameters of concern any time UCC requests no further action (NFA) at a unit.

Please submit one original and one copy of a revised CMI Report within 60 days of the receipt of this letter, and submit any future correspondence to Mr. Paul S. Lewis, Manager, Corrective Action Section, Industrial and Hazardous Waste Division, TNRCC, Box 13087, Austin, Texas 78711-3087. Also please send one copy of the report to TNRCC Region 15 in Harlingen, Texas.

If you have any questions concerning the comments in this letter, please contact Mr. Brad Wilkinson of the Corrective Action Team at (512) 239-2350.

Sincerely,



Paul S. Lewis, Manager  
Corrective Action Section  
Industrial & Hazardous Waste Division

PSL:BW/jo

cc: Bill Gallagher, EPA Region VI - Dallas  
TNRCC Region 15 - Harlingen  
Tennie Larson, I & HW Div., Corrective Action Section (CA-533)



## STANDARD OPERATING PROCEDURE

Title: Total Petroleum Hydrocarbons by GC-MS

Page: 1 of 13

Date: October 14, 1994

Number: 6900S080.69R

Revision: 1:

### 1.0 SCOPE AND APPLICABILITY

- 1.1 This method covers the determination of petroleum hydrocarbons. This method is applicable to nearly all types of samples, regardless of water content, including ground water, aqueous sludges, oily wastes, soils and sediments. The method is based on gas chromatography-mass spectrometry (GC-MS). The applicable practical quantitation limits (PQL) which are routinely determined by this method are listed in Table I.

TABLE I

TOTAL PETROLEUM HYDROCARBONS BY GC-MS

	WATER (µg/L)	SOIL (µg/kg)
TOTAL PETROLEUM HYDROCARBONS - Gasoline	250	250
TOTAL PETROLEUM HYDROCARBONS - Diesel	250	10000

- 1.2 Other methods which should be consulted for additional information include AnalytiKEM Standard Operating Procedures (SOPs) entitled
- "Determination of Volatile Organic Compounds by Purge-and-Trap Gas Chromatography-Mass Spectrometry".
  - "Determination of Semivolatile Organic Compounds by Capillary Column Gas Chromatography-Mass Spectrometry.
  - "Organochlorine Pesticide/PCB/BNA Extraction/Solids"
  - "Base/Neutral/Acids/Extraction/Liquids"
- 1.3 This method is based upon the following EPA methods:
- Volatile Organics - Method 8240, SW-846: *EPA Test Methods for Evaluating Waste-Physical/Chemical Methods*, 3rd Edition and promulgated updates, 1986, USEPA.

## STANDARD OPERATING PROCEDURE

Title: Total Petroleum Hydrocarbons by GC-MS

Page: 2 of 13

Date: October 14, 1994

Number: 6900S080.69R

Revision: 1:

---

- Semivolatile Organics - Method 8270, SW-846: *EPA Test Methods for Evaluating Waste-Physical/Chemical Methods*, 3rd Edition and promulgated updates, 1986, USEPA.
- 1.4 This method is applicable for the measurement of boiling point ranged from gasoline through crude oil (approximately C<sub>32</sub>). Gasoline range hydrocarbons are quantified through a purge-and-trap gas chromatograph-mass spectrometer while higher boiling hydrocarbons are quantified by GC-MS analysis of a solvent extract of the sample.
- 1.5 This method is not recommended for measurement of high molecular weight (approximately C<sub>32</sub>) or extremely polar hydrocarbons.

### 2.0 SUMMARY OF THE METHOD

- 2.1 This method involves the determination of hydrocarbons after extraction of the sample and injection of the extract into a GC-MS. Peaks are separated by the gas chromatograph and detected by the mass spectrometer which provides qualitative and quantitative information. An example chromatogram is shown in Figure 1.
- 2.3 Qualitative identification of the target analytes is performed using the expected chromatographic retention time characteristic of specific aliphatic hydrocarbons and by a mass spectral fragmentation pattern which is indicative of aliphatic hydrocarbons. Quantitative analysis of positively identified analytes is conducted using the internal standard technique.

### 3.0 HEALTH AND SAFETY

- 3.1 Personnel can be exposed to hazardous substances when standard solutions are prepared. Dilute solutions of standards are to be used whenever possible. Analysts are responsible for having read the appropriate Material Safety Data Sheets.
- 3.2 The instrumentation used in these analyses contains many heated areas. Other heated areas include the gas chromatograph inlet, the gas chromatograph column and the detector.
- 3.3 The instrumentation used in these analyses operates under 240 V and can be a source of electrical shock. All power to the instruments should be disabled when troubleshooting or repairing the instruments.

## STANDARD OPERATING PROCEDURE

**Title: Total Petroleum Hydrocarbons by GC-MS**

**Page: 3 of 13**

**Date: October 14, 1994**

**Number: 6900S080.69R**

**Revision: 1:**

---

- 3.4 All normal laboratory safety procedures are to be followed when performing these analyses.

### 4.0 INTERFERENCES

- 4.1 Method interferences may be caused by contaminants in solvents, reagents, glassware and other sample processing hardware. These contaminants may lead to discrete peaks and/or elevated baselines in chromatograms. All these materials must be demonstrated to be free of interferences under the conditions of the analysis by analyzing method blanks.
- 4.2 Matrix interferences may be caused by contaminants that are coextracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending on the nature and diversity of the site being sampled.
- 4.3 Contamination can occur whenever high level and low level samples are sequentially analyzed. Whenever an unusually concentrated sample is encountered, it should be followed by an analysis of solvent to check for cross-contamination.
- 4.4 Anomalous hydrocarbon patterns should be evaluated by examining individual mass spectra.
- 4.5 The presence of ketones (such as acetone, 2-butanone, 4-methyl-2-pentanone, or 2-hexanone) in the volatile fraction can produce positive interferences. The presence of phthalate esters (such as bis(2-ethylhexyl)phthalate) can produce positive interferences in the semivolatile fraction.

### 5.0 APPARATUS AND MATERIALS

- 5.1 Microsyringes - 10 ul, 25 ul and 50 ul, 20-gauge sideport needle and gas tight.
- 5.2 Volumetric flasks - various sizes (including 10 ml); Class A with ground glass stoppers.
- 5.3 Microvials - 0.3 ml, 1 ml; open hole cap with Teflon coated septum.
- 5.4 Helium - ultra-high purity for carrier gas.
- 5.5 Ferrules - graphite/vespel, 1/4 inch diameter and 0.5 mm.
- 5.6 Balance - Analytical, capable of accurately weighing 0.0001 g.

## STANDARD OPERATING PROCEDURE

**Title: Total Petroleum Hydrocarbons by GC-MS**

**Page: 4 of 13**

**Date: October 14, 1994**

**Number: 6900S080.69R**

**Revision: 1:**

---

5.7 Balance - Top-loader, capable of accurately weighing 0.01g.

5.8 Thermal Desorption System

5.8.1 The thermal desorption system consists of two pieces of equipment: a Tekmar Model 2016 Automatic Concentrator and a Tekmar LSC 2000 Sample Concentrator. Specifications and operating details for the thermal desorption system are described in AnalytiKEM SOP "Determination of Volatile Organic Compounds by Purge-and-Trap Gas Chromatography-Mass Spectrometry".

5.9 Gas Chromatograph/Mass Spectrometer (GC-MS) System

5.9.1 Gas chromatograph - An analytical system which is capable of temperature programming, on-column injection and variable flow rates. A system such as the Varian 3400 is suitable for this analysis. For semivolatile analyses, the gas chromatograph should be equipped with an autosampler which can be controlled by the GC-MS system software. A suitable autosampler is the CDS100.

5.9.2 Column - 6 ft x 4 mm ID glass, packed with 1% SP-1000 on Carbopack B (60/80 mesh); alternatively, 60 m x 0.75 mm ID VOCOL column or other megabore capillary column designed for volatile analyses.

5.9.3 Column - 30 m x 0.32 mm ID fused silica column such as DB-5 (J & W Scientific) or equivalent for semivolatile analyses.

5.9.3 Mass spectrometer - An analytical system which is capable of scanning from 35 to 260 amu every 3 seconds or less, utilizing 70 eV (nominal) electron energy in the electron impact ionization mode. A system such as the Finnigan INCOS 50 is suitable for this analysis.

5.9.4 GC-MS Interface - Gas chromatograph to mass spectrometer interface constructed of all-glass or glass-lined materials are recommended. A glass jet separator such as that manufactured by SGE Corp. is suitable. Glass surfaces may be deactivated by silanizing with dichlorodimethylsilane.

5.9.5 Data System - A computer system interfaced to the mass spectrometer which allows the continuous acquisition and storage on machine readable media of all mass spectra obtained throughout the duration of the chromatographic program is required. The computer must have software



## STANDARD OPERATING PROCEDURE

**Title: Total Petroleum Hydrocarbons by GC-MS**

**Page: 5 of 13**

**Date: October 14, 1994**

**Number: 6900S080.69R**

**Revision: 1:**

---

that allows searching any GC-MS data file for ions of specified mass and plotting such ion abundances versus time or scan number. This type of plot is defined as an Extracted Ion Current Profile (EICP). Software must also be available that allows integrating the abundance in any EICP between specified time or scan number limits. The most recent version of the EPA/NIH Mass Spectral Library should also be available.

### 6.0 REAGENTS

6.1 Methanol - purge and trap grade.

6.2 Methylene chloride - analytical reagent grade

6.3 Water - nanopure or equivalent grade; must be demonstrated to be free of target analytes through the analysis of daily laboratory blanks.

6.4 Stock standard solutions

6.4.1 Purchase gasoline as a commercial material or as supplied as a standard from manufacturers such as Supelco or Restek. Weigh approximately 20 mg of gasoline in a 10 ml volumetric and dilute to volume with methanol. Store all standard solutions in Teflon®-sealed screw cap vials, with no headspace, -15 to -10°C.

6.4.2 Purchase diesel as a commercial material or as supplied as a standard from manufacturers such as Supelco or Restek. Weigh approximately 500 mg of diesel in a 50 ml volumetric and dilute to volume with methylene chloride. Store all standard solutions in Teflon®-sealed screw cap bottles at 4°C.

6.5 Internal Standard/Surrogate Spiking Solution - Volatiles

6.4.1 Surrogate standards are added to all samples and calibration standards. The compounds utilized for this purpose by AnalytiKEM are 1,2-dichloroethane-d<sub>4</sub>, benzene-d<sub>6</sub>, toluene-d<sub>8</sub>, and 4-bromofluorobenzene.

6.4.2 Internal standards are added to all samples and calibration standards. The compounds utilized for this purpose by AnalytiKEM are bromochloromethane, 1,4-difluorobenzene, and chlorobenzene-d<sub>5</sub>.

## STANDARD OPERATING PROCEDURE

Title: Total Petroleum Hydrocarbons by GC-MS

Page: 6 of 13

Date: October 14, 1994

Number: 6900S080.69R

Revision: 1:

---

6.4.3 Prepare a mixture of surrogate and internal standards at a concentration of 50 ug/ml in methanol.

### 6.6 Internal Standard/Surrogate Standard Spiking Solutions - Semivolatiles

6.6.1 Surrogate standards are added to all samples and calibration standards at the time extraction is initiated. Surrogate standards utilized for this purpose by AnalytiKEM are phenol-d<sub>6</sub>, 2-fluorophenol, 2,4,6-tribromophenol, nitrobenzene-d<sub>5</sub>, 2-fluorobiphenyl and terphenyl-d<sub>14</sub>.

6.6.2 Prepare a mixture of acid surrogate standards at 200 µg/ml and base/neutral surrogate standards at 100 µg/ml.

6.6.3 Internal standards are added to all samples and calibration standards prior to analysis. Internal standards utilized by AnalytiKEM are 1,4-dichlorobenzene-d<sub>4</sub>, naphthalene-d<sub>8</sub>, acenaphthene-d<sub>10</sub>, phenanthrene-d<sub>10</sub>, chrysene-d<sub>12</sub>, and perylene-d<sub>12</sub>.

6.6.4 Prepare a mixture of internal standards at a concentration of 4000 µg/ml so that adding 10 µl to a 1 ml extract results in a final concentration of 40 µg/ml.

### 6.7 GC-MS Calibration Standard Solution - Volatiles

6.7.1 Prepare five GC-MS calibration standards containing gasoline at concentrations of 250 µg/L, 500 µg/L, 1000 µg/L, 2500 µg/L, and 5000 µg/L. These will be prepared in water and should only be store for one hour.

### 6.8 GC-MS Calibration Standard Solutions - Semivolatiles

6.8.1 Prepare five GC-MS calibration standards containing diesel at concentrations of 250 µg/ml, 500µg/ml, 1000 µg/ml, 2500 µg/ml and 5000 µg/ml in methylene chloride. Store at 4°C in Teflon®-sealed bottles. Discard after 6 months or when quality control samples indicate degradation.

## STANDARD OPERATING PROCEDURE

Title: Total Petroleum Hydrocarbons by GC-MS

Page: 7 of 13

Date: October 14, 1994

Number: 6900S080.69R

Revision: 1:

---

### 6.9 Matrix spiking solution.

6.9.1 Matrix spike standards are added to one per twenty samples per matrix. Matrix spike standards can serve as duplicates by spiking a second aliquot of the sample chosen for spiking. The compounds utilized for this purpose by AnalytiKEM are gasoline for volatile analyses and diesel for semivolatile analyses.

6.10 Prepare other standard solutions for calibration, matrix spikes, surrogate and internal standards and tuning as specified in AnalytiKEM SOPs "Determination of Volatile Organic Compounds by Purge-and-Trap Gas Chromatography-Mass Spectrometry" and "Determination of Semivolatile Organic Compounds by Capillary Column Gas Chromatography-Mass Spectrometry."

## 7.0 GC-MS CALIBRATION

### 7.1 Internal Standard Calibration

7.1.1 Prepare calibration standards at concentrations specified in section 6.

7.1.2 Calibration procedures and sample analysis require the instrumental and chromatographic parameters described in AnalytiKEM SOPs "Determination of Volatile Organic Compounds by Purge-and-Trap Gas Chromatography-Mass Spectrometry" and "Determination of Semivolatile Organic Compounds by Capillary Column Gas Chromatography-Mass Spectrometry."

7.1.3 Analyze each calibration standard. Gasoline standards are introduced into the gas chromatograph through the purge and trap system. Purge and trap, gas chromatographic and mass spectrometric conditions are described in the SOP for Volatile Analyses. Diesel standards are introduced into the gas chromatograph through the autosampler. Autosampler, gas chromatographic and mass spectrometric conditions are described in the SOP for Semivolatile Analyses.

7.1.4 Volatiles - Obtain a mass chromatogram for  $m/z$  43. The area for gasoline is integrated from pentane to the end of the chromatographic run. 1,4-Difluorobenzene is used as the internal standard for TPH.

7.1.5 Semivolatiles - Obtain a mass chromatogram for  $m/z$  57. The area is integrated over the diesel range in the lowest concentration standard. Acenaphthene- $d_{10}$  is used as the internal standard for TPH.

## STANDARD OPERATING PROCEDURE

Title: Total Petroleum Hydrocarbons by GC-MS

Page: 8 of 13

Date: October 14, 1994

Number: 6900S080.69R

Revision: 1:

---

7.1.6 Calculate response factors (RF) using the equation 1:

$$\text{Response Factor (RF)} = \frac{A_i * IS}{I_x * A} \quad (1)$$

where:

$A_i$  = Area of the peaks for gasoline or diesel

$A$  = Concentration of gasoline or diesel to be measured

$IS$  = Concentration of internal standard

$I_x$  = Area of internal standard

7.1.4 The average response factor (RF) must be calculated for all the peaks representative of the gasoline or diesel. Calculate the % Relative Standard Deviation (%RSD) of RF values using equation 2.

$$\%RSD = \frac{SD}{\bar{X}} \quad (2)$$

where:

$SD$  = Standard deviation

$\bar{X}$  = average of five response factors.

The %RSD must be less than 25%.

### 8.0 DAILY GC-MS PERFORMANCE TESTS

- 8.1 Daily GC-MS performance tests for tuning are described in AnalytiKEM SOPs "Determination of Volatile Organic Compounds by Purge-and-Trap Gas Chromatography-Mass Spectrometry" and "Determination of Semivolatile Organic Compounds by Capillary Column Gas Chromatography-Mass Spectrometry."
- 8.2 At the beginning of each 12 hour shift that analyses are to be performed, a GC calibration check must be performed to demonstrate the validity of the original calibration curve values.



## STANDARD OPERATING PROCEDURE

Title: Total Petroleum Hydrocarbons by GC-MS

Page: 9 of 13

Date: October 14, 1994

Number: 6900S080.69R

Revision: 1:

---

- 8.2.1 Volatiles - Analyze a calibration check sample containing gasoline at a level of 1000 µg/L. Instrumental and chromatographic conditions are described the volatiles SOP. The response factor is calculated as described in section 7.1.6.
- 8.2.2 Semivolatiles - Analyze a calibration check sample containing diesel at a concentration of 500 µg/ml. Instrumental and chromatographic conditions are described the semivolatiles SOP. The response factor is calculated as described in section 7.1.6.
- 8.2.3 The percent difference (%D) for the response factor for the compounds must be less than 30% for the initial calibration to be valid. The percent difference calculation is shown in equation 3.

$$\%D = \frac{RF_d - \overline{RF}}{\overline{RF}} * 100 \quad (3)$$

where:

RF<sub>d</sub> = Daily response factor

RF = Average response factor from initial calibration.

### 9.0 EXTRACTION PROCEDURES

#### 9.1 Volatiles - Soil and Water

- 9.1.1 Follow procedure described in AnalytiKEM SOP "Determination of Volatile Organic Compounds by Purge-and-Trap Gas Chromatography-Mass Spectrometry".

#### 9.2 Semivolatiles - Soil and Water

- 9.2.2 For soil samples follow procedure for BNAs described in AnalytiKEM SOP "Organochlorine Pesticide/PCB/BNA Extraction/Solids"
- 9.2.2 For water samples follow procedure for BNAs in AnalytiKEM SOP "Base/Neutral/Acids/Extraction/Liquids"

## STANDARD OPERATING PROCEDURE

Title: Total Petroleum Hydrocarbons by GC-MS

Page: 10 of 13

Date: October 14, 1994

Number: 6900S080.69R

Revision: 1:

---

### 10.0 GAS CHROMATOGRAPHY-MASS SPECTROMETRY ANALYSES

- 10.1 Analytical conditions for standards and sample extracts are described in AnalytiKEM SOPs entitled "Determination of Volatile Organic Compounds by Purge-and-Trap Gas Chromatography-Mass Spectrometry" and "Determination of Semivolatile Organic Compounds by Capillary Column Gas Chromatography-Mass Spectrometry."
- 10.2 Inject all standards and samples using the same conditions. Integrate the areas for volatile samples from the retention time of pentane to the end of the chromatographic run. Integrate the areas for semivolatile standards from the beginning of the diesel range hydrocarbons to the end of the chromatographic run. Record the resulting peak areas for calculations of response factors or concentrations.
- 10.3 If the total peak area exceeds the linear range of the system, dilute the extract and reanalyze.

### 11.0 CALCULATIONS

#### 11.1 Qualitative Analysis

- 11.1.1 Gasoline and diesel shall be identified by comparison of sample component retention times and the standard component retention times.
- 11.1.2 Positive identifications are made by comparison of the peak patterns in the standards with the patterns in the samples and reference mass spectra.

#### 11.2 Quantitative Analysis

- 11.2.1 Gasoline or diesel is quantified by the internal standard method.
- 11.2.2 For aqueous samples, the response factor (rf) from the working calibration curve analysis is used to calculate the concentration, in  $\mu\text{g/l}$  of total petroleum hydrocarbons in the sample.

## STANDARD OPERATING PROCEDURE

Title: Total Petroleum Hydrocarbons by GC-MS

Page: 11 of 13

Date: October 14, 1994

Number: 6900S080.69R

Revision: 1:

---

$$\text{Conc (ug/L)} = \frac{A_x * IS * V_t}{I_x * V_l * RF} \quad (4)$$

where:

$A_t$ , RF,  $I_x$  and IS are defined in section 8,

$V_t$  = Final volume of extract, including dilutions and

$V_l$  = Volume of water extracted (l).

- 11.2.3 For sediment/soil, sludge or waste samples, the response factor (RF) from the working calibration curve analysis is used to calculate the concentration, in  $\mu\text{g/Kg}$  of total petroleum hydrocarbons in the sample.

$$\text{Conc (ug/L)} = \frac{A_x * IS * V_t}{I_x * V_l * RF} \quad (5)$$

where:

$A_t$ , RF,  $I_x$  and IS are defined in section 8,

$V_t$  = Final volume of extract, including dilutions,

$W_s$  = Weight of sample extracted(g) and

D = % dry weight of the sample.

- 11.2.4 Sediment/soil samples are generally reported on a dry weight basis, while sludges and wastes are reported on a wet weight basis. Report the % moisture of the sample along with the data.
- 11.2.5 Report results without correction for recovery data. When duplicates and spiked samples are analyzed, report all data obtained with the sample results.

## STANDARD OPERATING PROCEDURE

**Title: Total Petroleum Hydrocarbons by GC-MS**

**Page: 12 of 13**

**Date: October 14, 1994**

**Number: 6900S080.69R**

**Revision: 1:**

---

### 12. QUALITY CONTROL/QUALITY ASSURANCE

#### 12.1 GC-MS Initial Calibration

- 12.1.1 Prior to the analysis of samples and blanks, the GC-MS system must be initially calibrated at five levels to determine the linearity of the response for total petroleum hydrocarbons. Once the system has been calibrated, the initial calibration must be verified every 12 hours that sample analyses are performed.
- 12.1.2 Calculate each response factor using equation 1.
- 12.1.3 Using the average RF from the initial calibration, calculate the percent relative standard deviation (%RSD) for total petroleum hydrocarbons using equation 2.
- 12.1.4 The %RSD for total petroleum hydrocarbons must be less than or equal to 25 percent. This criteria must be met for the initial calibration to be valid.

#### 12.2 GC-MS Continuing Calibration Check

- 12.2.1 A calibration check standard containing either gasoline or diesel must be analyzed at the beginning of the 12 hour shift. This check standard is the mid-level standard.
- 12.2.2 Calculate the %D for either gasoline or diesel response factor from the continuing calibration and the average response factor from the five point initial calibration using equation 3.
- 12.2.3 If the percent difference for any compound is greater than 30%, a new initial calibration must be generated. These criteria must be met before sample analysis begins.

#### 12.3 Method Blank Analysis

- 12.3.1 A method blank consisting of reagent water or anhydrous sodium sulfate must be carried through the entire analytical scheme.
- 12.3.2 At a minimum, one method blank per matrix per day must be extracted and analyzed.



## STANDARD OPERATING PROCEDURE

**Title: Total Petroleum Hydrocarbons by GC-MS**

**Page: 13 of 13**

**Date: October 14, 1994**

**Number: 6900S080.69R**

**Revision: 1:**

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12.3.3 An acceptable method blank should contain no detectable amounts of total petroleum hydrocarbons.

12.3.4 If a laboratory method blank exceeds these levels, the analyst must consider the analytical system to be out of control. The source of the contamination must be investigated and appropriate corrective measures must be taken and documented before sample analysis can proceed.

### 12.4 Matrix Spike/Matrix Spike Duplicate Analysis

12.4.1 On a regular basis, a matrix spike and a matrix spike duplicate must be analyzed for each batch (maximum 20 samples/batch) of samples with the same matrix. A minimum of one matrix spike and matrix spike duplicate per matrix must be analyzed every month.

12.4.2 Samples are matrix spiked with gasoline or diesel matrix spike standard for a final concentration of 2.5 mg/L or 250 mg/kg.

## 13.0 METHOD PERFORMANCE

13.1 The method detection limit (MDL) is defined as the minimum concentration that can be measured and reported with 99% confidence that the value is above zero.

15.2 This method was validated by AnalytiKEM Laboratories using reagent water spiked at 5.0 mg/L. Quadruplicate measurements were obtained and precision and recovery were calculated and are available at the laboratory.

# **Union Carbide Corporation**

Brownsville, Texas



Revised Risk Reduction  
Rules - Standard 2  
Corrective Measures  
Implementation Report  
for Solid Waste  
Management Unit Z  
"Old Oil Skimmer Pits"  
Union Carbide Corporation  
Brownsville, Texas Facility

**ENSR Consulting and Engineering**

**October 1994**

**Document Number 6900-080-391**

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**Revised Risk Reduction Rules Standard 2**

**Corrective Measures Implementation Report for  
Solid Waste Management Unit Z, "Old Oil  
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**Union Carbide Corporation**

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# CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>E-1</b>
<b>1.0 INTRODUCTION .....</b>	<b>1-1</b>
1.1 Objectives of Remediation .....	1-1
1.2 Background Information .....	1-4
1.3 Site Geology .....	1-4
1.3.1 General Site Geology and Stratigraphy .....	1-4
1.3.2 Site-Specific Geology and Stratigraphy .....	1-4
1.4 Description of SWMU Z .....	1-5
1.4.1 Operational History of SWMU Z .....	1-5
1.4.2 Physical Description of SWMU Z .....	1-6
<b>2.0 AGENCY INTERACTIONS .....</b>	<b>2-1</b>
2.1 Notification Letter .....	2-1
2.2 TNRCC Response .....	2-1
2.3 Facility Audit by TNRCC .....	2-1
2.4 Public Notice/Affidavit .....	2-1
2.5 TNRCC Response to Closure Completion Report .....	2-1
<b>3.0 RATIONALE FOR SELECTION OF REMEDIATION STANDARD 2 .....</b>	<b>3-1</b>
3.1 Criteria for Attainment of Risk Reduction Standard 2 .....	3-1
3.2 Criteria for Selection of Non-Residential Soil Requirements .....	3-2
3.3 Adjustments to MSCs for Standard 2 Closure .....	3-3
3.4 Contaminated Media and Constituents of Concern .....	3-3
<b>4.0 REMEDIATION PROCEDURES .....</b>	<b>4-1</b>
4.1 Excavation of SWMU Z Waste Soil .....	4-1
4.2 Soil Verification Samples .....	4-2
4.3 Backfill of Excavation .....	4-8
<b>5.0 WASTE MANAGEMENT .....</b>	<b>5-1</b>
<b>6.0 DEED CERTIFICATION .....</b>	<b>6-1</b>
<b>7.0 CONCLUSIONS .....</b>	<b>7-1</b>

**CONTENTS**  
(Cont'd)

**APPENDICES**

- A AGENCY CORRESPONDENCE
- B BROWNSVILLE NAVIGATION DISTRICT LETTER
- C VERIFICATION SAMPLE RESULTS
- D WASTE CHARACTERIZATION ANALYTICAL RESULTS
- E CERTIFICATION OF REMEDIATION

**LIST OF TABLES**

1-1	Shallow and Deep Soil Results Greater than Standard 2 Obtained During the RFI .....	1-2
1-2	Soil Standard 1 and 2 Criteria - Metals .....	1-3
3-1	Calculation Background Concentration for Arsenic .....	3-5
4-1	Summary of Analytical Results for Appendix IX Constituents and TPH .....	4-5
5-1	Results of Waste Disposal Analyses for SP1-SP2 Soils (from 0-3 feet) and SP3 Soils (from >3 feet) .....	5-2
5-2	Results of TPH and BTEX Waste Characterization Analysis for TPH (IR) and BTEX Constituents .....	5-5

**LIST OF FIGURES**

1-1	Site Location Map .....	1-7
1-2	Location of SWMU Z .....	1-8
1-3	SWMU Z - RFI Boring and Monitor Well Locations .....	1-9
4-1	SWMU Z Verification Sample Locations .....	4-4

## **EXECUTIVE SUMMARY**

Union Carbide Corporation (UCC), working with ENSR Consulting and Engineering (ENSR), managed the remediation and closure of Solid Waste Management Unit (SWMU) Z, "Old Oil Skimmer Pits," located at UCC's Brownsville, Texas facility prior to the facility's eventual divestiture back to the Brownsville Navigation District (BND). The remediation activities commenced on 17 NOV 93 and were completed on 01 FEB 94.

The RCRA Facility Investigation (RFI) Workplan, submitted to the Texas Natural Resource Conservation Commission (TNRCC) on 30 JUL 93, indicated that SWMU Z soils meet Texas Risk Reduction Rules (RRR) Standard 2 criteria with no further environmental action being necessary. However, UCC has remediated SWMU Z to satisfy internal UCC divestiture criteria established for the non-Appendix IX constituent, total petroleum hydrocarbons (TPH).

SWMU Z, known as the "Old Oil Skimmer Pits," consists of an area approximately 120 feet long and 50 feet wide, and 3.5 feet deep at the time of operation. The precise number of pits in this area is unknown. The unlined pits were operated between 1950 and 1957 by Amoco, previous owner of the facility, and were used to manage waste oil/water mixtures from site operations.

Prior to beginning remediation, notification was made to the TNRCC of UCC's plans to close SWMU Z under the Risk Reduction Rules (RRR) by demonstrating the soils meet Standard 2 criteria. The attainment of a Standard 2 closure for an area requires that all wastes, waste residues and contaminated media be removed or decontaminated to Medium Specific Concentrations (MSC), the area be deed recorded by the Brownsville Navigation District to indicate the levels of contamination that remain, and a Corrective Measure Implementation Report be submitted to the TNRCC. To demonstrate the attainment of Standard 2 criteria, UCC established Standard 2 risk criteria for the RFI by either using MSCs from the TNRCC Appendix II table, or developing MSCs from appropriate alternative methods using RRR approaches. As allowed by the Risk Reduction Rules, a 100X adjustment to the groundwater MSCs (GW) was made due to total dissolved solids in groundwater consistently averaging over 10,000 mg/l, (see the RFI Workplan). The adjusted GW was used to calculate an adjusted soil-to-groundwater cross media factor (GWP), by multiplying by a additional factor of 100, resulting in site-specific GWP values adjusted by a total factor of 10,000. These adjusted values were the Standard 2 GWP evaluation criteria for the closure of SWMU Z. UCC demonstrated it met Non-Residential Soil Requirements by presenting its Standard Industrial Classification (SIC) 2869, which fulfills the description of a non-residential property and by being located in an industrial land use area.



The RFI Workplan, submitted 30 JUL 93, and the Corrective Measures Implementation (CMI) RRR Workplan, submitted to the TNRCC on 01 APR 94, demonstrate that the SWMU Z soils met Standard 2 criteria prior to remediation for divestiture purposes. Arsenic, lead and mercury were identified during the RFI as exceeding Standard 2 MSCs for SWMU Z, but these are considered by UCC to be representative of background soil concentrations.

Divestiture remedial activities were conducted in accordance with the approved Project Health and Safety Plan. The excavated area measured approximately 130 feet by 50 feet and was approximately 12 feet deep. Groundwater was encountered during the excavation at approximately 12 feet, in visually clean native soil. Soil verification samples were collected from the excavation side walls as specified in the CMI Workplan, dated 01 APR 94, but no samples were collected from the floor of the excavation due to groundwater being encountered. A monitoring well installed and sampled in SWMU Z during the RFI indicated compliance with groundwater RRR Standard 2 criteria.

Preliminary field estimates indicate that approximately 2,545 cubic yards of soil were excavated from SWMU Z. The soils were segregated and placed into stockpiles based on visual evaluation of their hydrocarbon contamination.

Soil verification samples collected from the sidewalls were analyzed for the presence of TPH as determined by GC/MS and were determined to meet UCC's TPH divestiture criteria (1,000 mg/kg). To demonstrate the low risk to human health and the environment posed by the remaining soils, to demonstrate compliance with the RRR Standard 2 closure criteria, and to satisfy the requirements of the disposal facilities, the divestiture soil verification samples were also analyzed for selected metals, and volatile and semi-volatile extractable compounds, including polynuclear aromatic hydrocarbons. Results indicated that the site complied with Standard 2 Closure Criteria.

The excavation was backfilled with clean soil which had been previously analyzed by UCC for the presence of hazardous constituents and determined to be suitable for its intended use.

The waste soils, disposed of off site, were managed as Class I and Class II (Nonhazardous) Industrial Solid Waste. Waste manifests indicate that 1,122 cubic yards of soil were disposed of as Class II waste at Browning-Ferris Industries' Sinton, Texas landfill, and 1,578 cubic yards of Class I waste were disposed of at Texas Ecologists' landfill in Robstown, Texas.

UCC will provide deed certification information (as described in Appendix E) to the Brownsville Navigation District to be filed in the deed records of Cameron County, Texas. The Brownsville

Navigation District shall provide proof of this filing within 90 days of TNRCC acceptance of this report.

On the basis of field observations as well as the analytical data presented in this report and the RFI Workplan (30 JUL 93), UCC has concluded that the soils remaining in SWMU Z meet Risk Reduction Standard 2 criteria.

## 1.0 INTRODUCTION

Union Carbide Corporation (UCC) working with ENSR Consulting and Engineering (ENSR), managed the corrective measures implementation of Solid Waste Management Unit (SWMU) Z, "Old Oil Skimmer Pits", located at UCC's Brownsville, Texas facility prior to the eventual divestiture of the facility to the Brownsville Navigation District (BND). The corrective measures, which commenced on 17 NOV 93, was performed in accordance with Title 30 of the Texas Administrative Code (TAC) 335, Subchapter S. This report documents the closure procedures and describes work performed, analytical results, waste disposition, final configuration of SWMU Z, and certification of closure by UCC.

### 1.1 Objectives of Remediation

Based on RFI activities and analyses, SWMU Z meets Risk Reduction Rules Standard 2 criteria with no further action. Table 1-1 presents the concentrations of waste constituents within SWMU Z compared with the Medium Specific Concentrations (MSCs) established for each constituent for this site.

UCC believes arsenic (7.9 mg/kg), though slightly exceeding Standard 2, is less than the background concentration (Table 1-2 Soil Background Concentrations - Metals) for the facility's geographical location and does not require any remedial action under TNRCC RRR. Lead (200 mg/kg) and mercury (22.8 mg/kg) also slightly exceeded Standard 2. These areas were remediated as part of the divestiture remedial activities for total petroleum hydrocarbons.

To satisfy criteria within UCC's divestiture agreement with the Brownsville Navigation District, UCC has remediated SWMU Z to adequately remediate total petroleum hydrocarbons (TPH) identified within SWMU Z during the divestiture investigation. SWMU Z is being closed by demonstrating that the environmental conditions satisfy the Risk Reduction Rules (RRR) Standard 2 Closure criteria (30 TAC § 335.555-560). Previous RCRA Facility Investigations (RFIs) of the unit indicated that remediation to a Standard 1 criteria (30 TAC § 335.554) would not be practical, given the extensive industrial history of the site. As a result, UCC received permission from the landowner, Brownsville Navigation District, to close SWMU Z to RRR Standard 2 criteria.



**TABLE 1-1**

**Shallow and Deep Soil Results for SWMU Z**  
**Greater Than Standard 2**  
**From the RFI**  
**UCC - Brownsville, Texas**

FIELD ID	SHALLOW SOIL RESULTS (mg/kg)		CRITERIA (mg/kg)		
	PARAMETER	CONCENTRATION	GWP-IND	SAI-IND	BACKGROUND
SS-7693-7-2	ARSENIC	7.9	500	3.27	8.6
SS-7693-8-2	ARSENIC	4.9	500	3.27	8.6

FIELD ID	DEEP SOIL RESULTS (mg/kg)		CRITERIA (mg/kg)
	PARAMETER	CONCENTRATION	GWP-IND
SS-7693-5-2/19	LEAD	200	150
SS-7693-5-2/19	MERCURY	22.8	20

**TABLE 1-2**
**Soil Standard 1 and 2 Criteria  
Metals**

Parameter	Soil Background <sup>1</sup> (mg/kg)	Practical Quantitation Limit (mg/kg)	GWP-Ind <sup>2</sup> (mg/kg)	SAI-Ind <sup>2</sup> (mg/kg)
Arsenic	8.6	0.25	500	3.27
Barium	322	2	20000	137268
Beryllium	3.1	2	40	1.33
Cadmium	3.1	1	50	1020
Chromium	13	2	1000	5110
Cobalt	3.52	2.5	13000 <sup>3</sup>	75627.75 <sup>3</sup>
Copper	11	2	13000 <sup>3</sup>	75627.75 <sup>3</sup>
Lead	14	5	150	1000
Mercury	0.084	0.05	20	613
Nickel	15	2	1000	20400
Selenium	0.69	0.25	500	10200
Silver	1.5	1	5110	10200
Thallium	0.70	0.5	20 <sup>4</sup>	143 <sup>4</sup>
Vanadium	48	2.5	2550 <sup>4</sup>	14300 <sup>4</sup>
Zinc	61	2	109500 <sup>4</sup>	613000 <sup>4</sup>
<sup>1</sup> - Soil Background concentration calculated using a tolerance interval constructed from four measurements. <sup>2</sup> - Values from Texas Risk Reduction Rules, 6/28/93 <sup>3</sup> - Based on Texas Risk Reduction Rules and data for copper. <sup>4</sup> - Based on Texas Risk Reduction Rules guidelines.				

## **1.2 Background Information**

UCC conducted an investigation of SWMU Z as part of the RFI conducted for the UCC Brownsville, Texas facility. The results of the previous RFI for SWMU Z are presented in the RFI Workplan, submitted 30 JUL 93 and the recently submitted Corrective Measures Implementation (CMI) Workplan, dated 01 APR 94.

## **1.3 Site Geology**

### **1.3.1 General Site Geology and Stratigraphy**

The UCC Brownsville, Texas facility encompasses a topographically flat to gently sloping site. Excluding areas of higher relief, the UCC site has a mean elevation of 8-10 feet above mean sea level (MSL) with a gentle slope toward the northeast. Topographically high areas include tank dikes and areas filled with material as a result of past construction and road building activities. The topography of the site prior to plant construction is presumed to have been a flat lowland area within the flood plain of the Rio Grande that may have ponded or flooded seasonally.

Sediments encountered during the RFI background investigation are the result of fluvial deposition during both the Holocene and Upper Pleistocene epochs, as discussed in Section 3.3.1 of the RFI Workplan (RFI), submitted 30 JUL 93. Layers of sand, silt, and clay were deposited, scoured, removed, and redeposited in lobate to linear bands that generally trend southeast following the rivers and streams which deposited them. Generally, the finer grained clays and silts were laid down as overbank and interdistributary deposits between stream channels where coarser sands predominate. As the streams or rivers moved laterally, so did their deposits creating a complex sequence of interbedded sands, silts, and clays.

### **1.3.2 Site-Specific Geology and Stratigraphy**

The stratigraphic units beneath the UCC site have been characterized and differentiated (beginning with the shallowest unit) as follows:

Zone 1A: **Fill: Sand, Sandy Clay, Silty Clay, Clay:** brown to reddish brown, dark gray, loose, firm to hard with occasional shell, gravel, organic debris, and lime, 4 to 10 feet thick.

- Zone 1: **Silty Clay and Clay:** brown, reddish brown, gray, dark greenish gray, soft-stiff, occasional gray silt vertical partings, orange staining, occasional caliche nodules, calcareous shell fragments, and black carbon streaking, 5 to 12 feet thick.
- Zone 2: **Sands, Silty Sands, Clayey Sands, Silts, Clayey Silts:** fine-grained, yellow-brown, tan-brown, dark gray-greenish gray, moist-wet, very loose to medium dense, 2 to 32 feet thick.
- Zone 3: **Silty Clay, Sandy Clay, Clay:** greenish-gray, brown, occasional green gray mottling, hard, caliche nodules, orange staining, 5.7 to 16.8 feet thick.
- Zone 4: **Silts, Clayey Silts, Silty Sand:** fine-grained, brown to reddish brown, gray, occasional olive gray mottling, moist, loose-medium dense, stiff-very stiff, 1 to 7.3 feet thick.
- Zone 5: **Silty Clay and Clay:** brown-reddish brown, olive gray mottling, stiff to very hard, occasional orange staining, 11 to 27 feet thick.
- Zone 6: **Silts, Silty Sands, Clayey Silts:** fine grained, brown, moist-wet, medium dense-dense, firm, 1 to 7.2 feet thick.

Stratigraphic cross-sections were generated depicting the geologic units and their inter-relationships using data gathered during the JUN 92 Background Investigation's exploratory boring program and monitor well installations. Depths to stratum boundaries and strata geometry are inferred between data points (exploratory soil borings and monitor wells). Refer to Figure A-24 (Appendix A) of the RFI Workplan to view a geologic cross-section location map. The stratigraphic sequence and relationship of the hydrogeologic units and geologic units and an explanation of graphic symbols is presented as Figures A-25 and A-26 (Appendix A) of the RFI Workplan. ENSR's lithologic logs, strata descriptions, and stratigraphic cross sections were compared to and generally confirmed the interpretation in the 1991 Halliburton NUS reports.

## 1.4 Description of SWMU Z

### 1.4.1 Operational History of SWMU Z

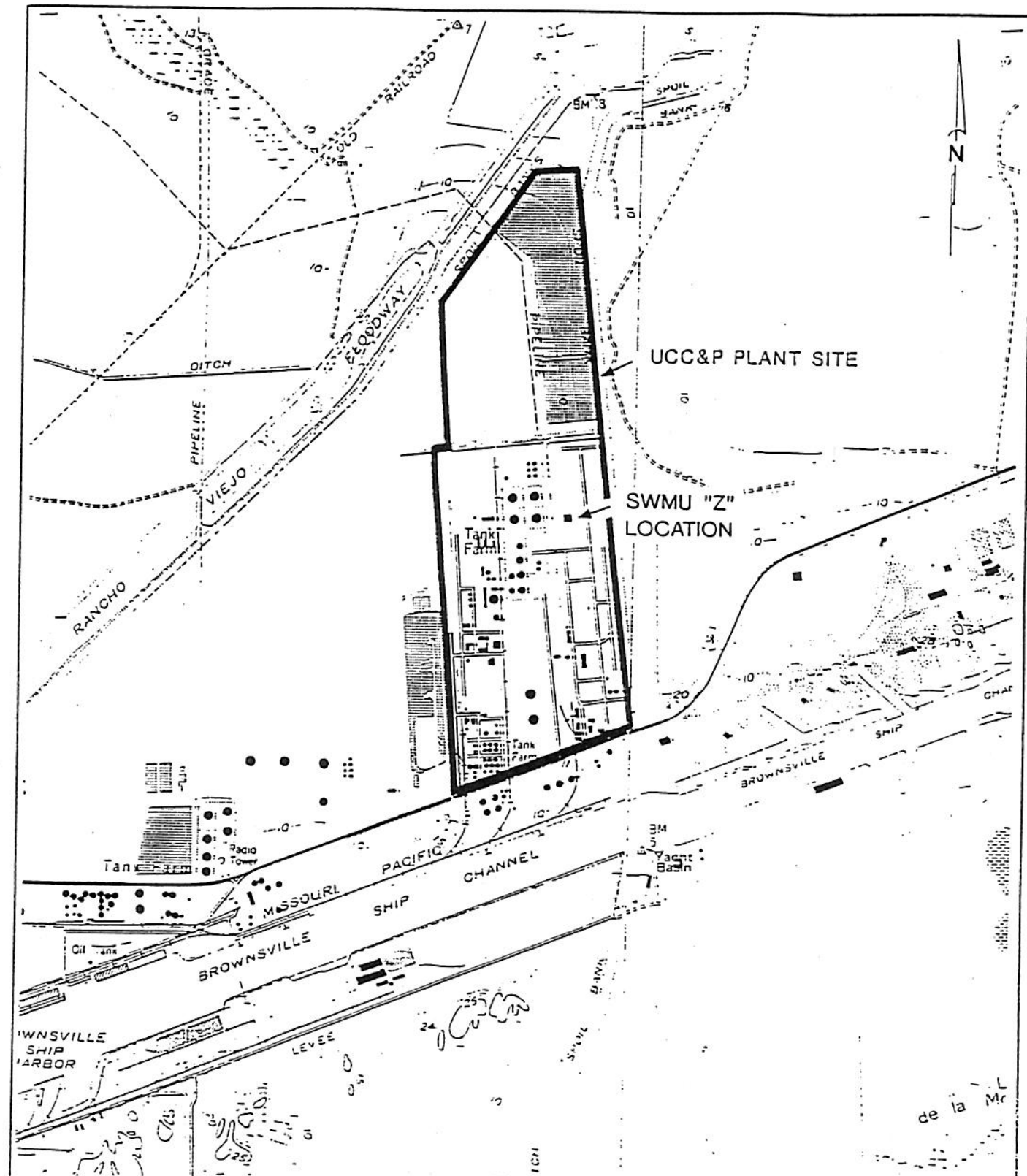
This unit operated between 1950 and 1957 during Amoco ownership, and was used to manage waste oil/water mixtures from site operations. SWMU Z was not operated during UCC ownership of the facility.



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#### **1.4.2 Physical Description of SWMU Z**

The location of the facility is shown in Figure 1-1. SWMU Z is located in Facility Zone 76 [see Figure 1-2 and Figure 1-3 (Detail)]. Figure 1-3 shows the locations of the RFI sample borings and monitor well. These sample locations are for the individual borings, but for each boring, two or more samples were taken during the RFI. Those samples are designated with the boring number on this map and with the x replacing the various sample depths. The results for these specific samples are presented in the RFI Workplan submitted to the TNRCC on 30 JUL 93. Location of remediation verification samples are presented in Section 4.0. The unit consisted of two long, narrow, earthen pits and numerous other smaller earthen pits. The precise number of unlined pits comprising the unit is unknown. The unit appeared to be approximately 120 feet long, 50 feet wide, and 3.5 feet deep at the time of its operation.



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FIGURE 1-1

**SITE LOCATION MAP**

UNION CARBIDE CORPORATION  
BROWNSVILLE, TEXAS

DRAWN BY: SJF

DATE: 9-4-92

PROJECT  
NUMBER:

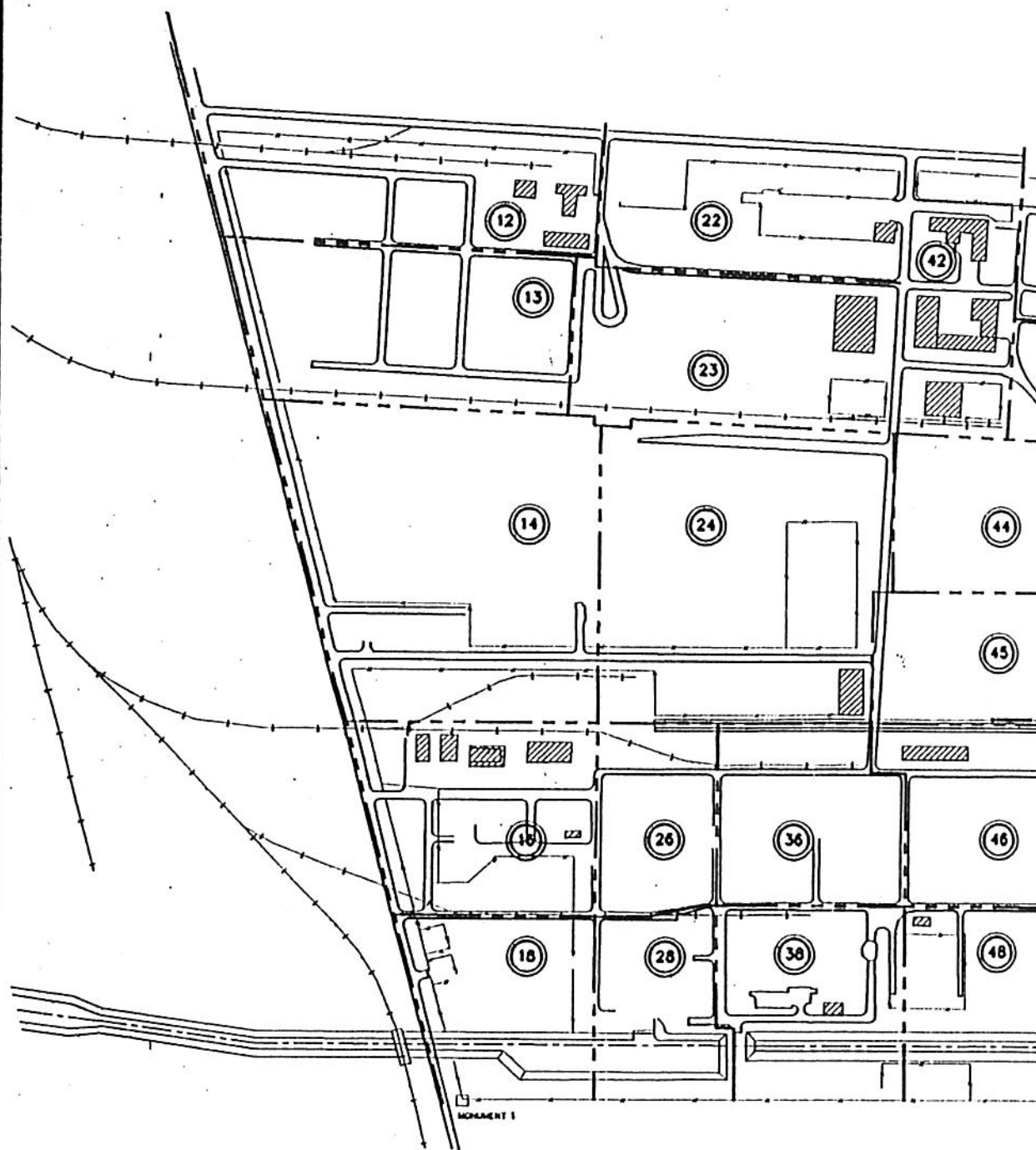
CHECKED BY:

REVISED

6900-020

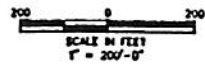
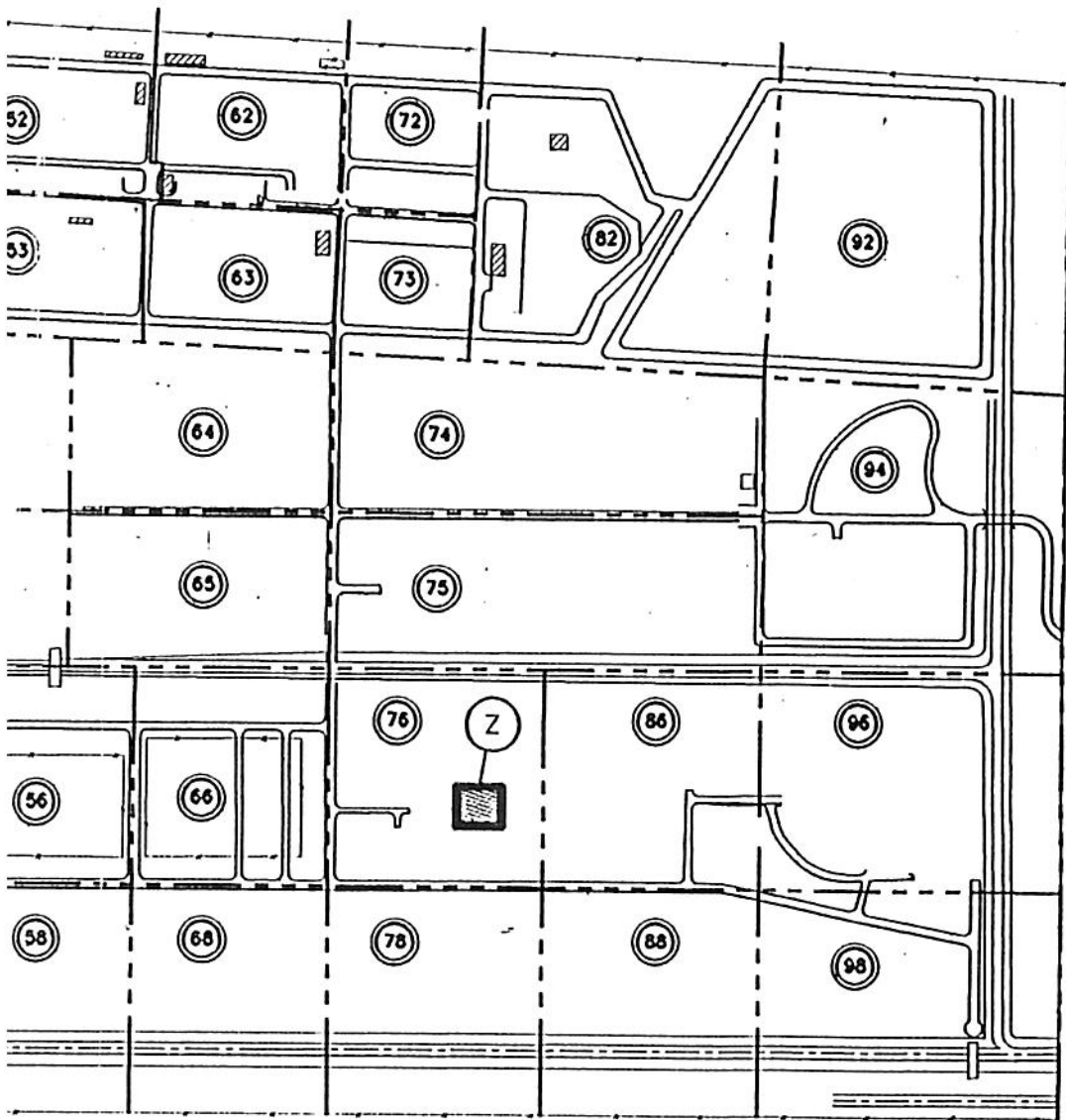
REFERENCE: U.S.G.S. Quadrangle Map for  
East Brownsville and Palmito Hill,  
Texas, 1983.





MONUMENT 1

PLANT HORIZONTAL POSITION - 00+00 E. 00+00 N  
 TEXAS STATE PLANE POSITION - S-2.368, N01.00  
 Y= 108.863.88  
 ELEVATION MEAN LOW TIDE - 11.84 M  
 ELEVATION MEAN SEA LEVEL - 10.98 MCD 1928 DATUM



# LEGEND

- PLANT ZONE BOUNDARY
- (76) - PLANT ZONE DESIGNATION
- (Z) - SWMU DESIGNATION
- SWMU BOUNDARY
- ▨ - EXISTING BUILDINGS ON SITE

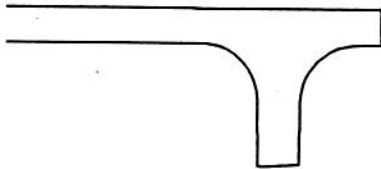
**ENSR**  
ENSR CONSULTING & ENGINEERING

FIGURE 1-2  
LOCATION OF SWMU Z  
UNION CARBIDE CORPORATION  
BROWNSVILLE, TEXAS

DRAWN: N.L. JONES	DATE: 09 MAR 94	PROJECT NUMBER
APPVD:	REVISED: 12 MAY 94	6900-080-361

TRUE NORTH

76



SWMU  
Z

SS-7693-5-X  
SS-7693-4-X  
SS-7693-3-X

SS-7693-8-X  
SS-7693-7-X  
SS-7693-6-X

MW-7692-4-2

0 50 100



SCALE IN FEET

# LEGEND



- FACILITY ZONE DESIGNATION



- ENSR SOIL BORING



- ENSR MONITOR WELL LOCATION

**ENSR**<sup>TM</sup>

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FIGURE 1-3  
SWMU Z - RFI BORING  
AND MONITOR WELL LOCATIONS  
UNION CARBIDE CORPORATION  
BROWNSVILLE, TEXAS

DRAWN: LG/SF/JM

DATE: 14 OCT 94

PROJECT  
NUMBER:

APPVD:

REVISED:

6900-080-391

## **2.0 AGENCY INTERACTIONS**

### **2.1 Notification Letter**

UCC notified TNRCC's Executive Director, Mr. Anthony C. Grigsby, of its intent to close SWMU Z by the attached letter, dated 19 OCT 93 (Appendix A).

### **2.2 TNRCC Response**

UCC received the attached (Appendix A) TNRCC response to UCC's closure notification, dated 12 JAN 94.

### **2.3 Facility Audit by TNRCC**

On 08 FEB 94, Mr. Carlos Rubinstein (TNRCC - District 15) performed an audit and inspection of the UCC Brownsville, Texas facility, accompanied by Mr. R.E. O'Bryan, UCC, Brownsville, Texas Site Remediation Program Manager. No substantive issues were determined as a result of that audit.

### **2.4 Public Notice/Affidavit**

As required by the TNRCC, a Notice of Proposed Corrective Measures Implementation was published in *The Brownsville Herald* on 31 AUG 94. A copy of this notice and the attached affidavit are included in Appendix A.

### **2.5 TNRCC Response to Closure Completion Report**

UCC received the attached (Appendix A) TNRCC response dated 23 SEP 94 to UCC's original submittal of the Corrective Measure Implementation Report for SWMU Z which was dated 10 JUN 94.



### **3.0 RATIONALE FOR SELECTION OF REMEDIATION STANDARD 2**

This section presents an evaluation of criteria to be met for a RRR Standard 2 closure of SWMU Z.

#### **3.1 Criteria for Attainment of Risk Reduction Standard 2**

In accordance with 30 TAC §335.555 compliance with the standard is attained when the following criteria for non-hazardous industrial solid waste management units are met:

- 1) For closure of non-hazardous industrial solid waste management units, response to unauthorized discharges of non-hazardous industrial solid waste, and the remediation of media that have become contaminated by discharges of non-hazardous industrial solid waste or other contaminants, all waste and waste residues, contaminated design and operating system components such as liners, leachate collection systems and dikes, and contaminated media must be removed or decontaminated to Standard 2 Medium Specific Concentrations (MSC).
- 2) Also, the contaminant in a contaminated media of concern such as groundwater, surface water, air or soil shall not exceed MSC cleanup levels.
- 3) Attainment of Standard 2 cleanup levels shall be demonstrated by collection and analysis of samples from the contaminated media of concern utilizing techniques described in SW 846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency (EPA) or other available guidance in developing a sampling and analysis plan appropriate for evaluation of the contaminants and environmental media. A sufficient number of samples shall be collected and analyzed for individual compounds to both accurately assess the risk to human health and the environment posed by the facility or area and to demonstrate the attainment of cleanup levels. Achievement of the cleanup levels shall be demonstrated by the following methods:
  - a) direct comparison of the results of analysis of discrete samples of the medium of concern with the cleanup level;

- b) for a data set of ten or more samples, statistical comparison of the results of analysis utilizing the 95% confidence limit of the mean concentration, as described in 30 TAC §335.553 (d)(2).
- c) other statistical methods with prior approval of the executive director.
- 4) The person must prepare a document that he intends to use to fulfill the deed certification requirements of 30 TAC §335.560 and include the document as part of the Corrective Measure Implementation Report.
- 5) The person must prepare a Corrective Measure Implementation Report that documents compliance with 30 TAC §335.555.

### 3.2 Criteria for Selection of Non-Residential Soil Requirements

The facility property where the closure was conducted meets the conditions of non-residential property in accordance with 30 TAC § 335.557(2), which states that persons may provide documentation that the activities being conducted on the property satisfy the definition for non-residential properties set forth in § 335.553.

The definition of a non-residential property is *any real property or portion of a property not currently being used for human habitation or other purposes with a similar potential for human exposure, at which activities have been or are being conducted, having the primary Standard Industrial Classification (SIC) major group numbers 01-48 inclusive, 49 except 4941, 50-67 inclusive, 72-79 inclusive, 80 except 8051, 8059, 8062, 8063, 8069, 81 and 82 except 8211, 8221, 8222, 83 except 8351, 8361, 84-86 except 8661, 87-91 inclusive, 92 except 9223, and 93-97 inclusive.*

The SIC code for UCC's Brownsville facility is 2869, which fulfills the description of a non-residential property. Therefore, the remediation standards for this closure are non-residential (industrial) standards.

In addition, the UCC facility is clearly located in an industrial land use area on property owned by the Brownsville Navigation District (BND), which offers its land for lease for industrial development purposes. The BND has confirmed the industrial nature of this facility property in a letter dated 25 JUL 94 to the TNRCC (Appendix B).



### 3.3 Adjustments to MSCs for Standard 2 Closure

Standard 2 risk criteria were established for UCC's Brownsville, Texas facility RFI by using either MSCs provided in the tables in Appendix II of 30 TAC § 335 Subchapter S or calculating criteria using TNRCC RRR methodology or alternate methods when appropriate data was unavailable for TNRCC methods. A detailed explanation of the criteria and their method of selection and calculation is provided in the RFI Workplan, submitted to the TNRCC 30 JUL 93.

As discussed in the RFI Workplan, groundwater MSCs (GW) were adjusted upward by a factor of 100 as allowed under RRR because groundwater analyzed from the site consistently averaged over 10,000 mg/l total dissolved solids (TDS). The adjusted groundwater criterion was then used to develop an adjusted GWP by multiplying again by 100, as applied in all cases because of the soil-to-groundwater cross-media factor, for a total multiplication factor of 10,000. These adjusted values are also reflected in Table 3-1 of the CMI Workplan, dated 01 APR 94.

### 3.4 Contaminated Media and Constituents of Concern

Based on the analytical results submitted in the RFI Workplan and presented in the CMI Workplan, SWMU Z soils met RRR Standard 2 criteria prior to remediation. The soils have been remediated to satisfy UCC's internal divestiture standards for TPH.

UCC believes arsenic (7.9 mg/kg), though slightly exceeding Standard 2, is less than the background concentration (Table 1-2) for the facility's geographical location and does not require any remedial action under TNRCC RRR. Lead (200 mg/kg) and mercury (22.8 mg/kg) also slightly exceeded Standard 2. These values areas remediated as part of the divestiture remedial activities for total petroleum hydrocarbons.

Background concentrations were calculated by constructing tolerance intervals (Equation 1) using the data obtained from background samples collected during the RFI activities.

$$\text{Tolerance Interval} = \bar{x} + t s \quad (1)$$

where  $\bar{x}$  = Average of concentrations from background samples,  
 $t$  = Student's  $t$  value for number of determinations, and  
 $s$  = standard deviation of concentrations from background samples.



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An example calculation of the background concentrations (arsenic) using data obtained during the RFI Workplan activities (30 JUL 93) is shown in Table 3-1.

UCC conducted verification sampling targeting TPH, metals and selected Appendix IX constituents within the residual soils. TPH analysis by GC/MS was used exclusively to verify compliance of the remediation with the divestiture criterion (i.e., TPH). Other specific analytes of concern were analyzed as a part of this method.

TABLE 3-1

Calculation of Background Concentration for Arsenic

Parameter	SB-2292-1-1	SB-2292-2-1	SB-2292-3-1	SB-2292-4-1	Avg (mg/kg)	Std. Dev.	t	Background Concentration (mg/kg)
Arsenic	4.7	3.8	2.1	4.1	3.7	0.96	5.145	8.6
SB-2292-1-1 through SB-2292-4-1 are background samples. See RFI Final Report (30 JUL 93) for further discussion.								
t = Students t value								

## 4.0 REMEDIATION PROCEDURES

### 4.1 Excavation of SWMU Z Waste Soil

The remediation of SWMU Z TPH contaminated soils and associated field activities were conducted in accordance with the approved Project Health and Safety Plan. The plan was followed, without incident, in compliance with OSHA 29 CFR Part 1910 regulations, and with UCC and ENSR health and safety requirements.

The excavation measured approximately 130 feet by 50 feet and was approximately 12 feet deep. Excavation was achieved using a tracked excavator. Groundwater was encountered during the excavation at approximately 12 feet below surface, and no soil was removed from below groundwater.

Prior to fully initiating excavation activities, several test pits were excavated at various locations in the SWMU and excavated soils were field screened into separate stockpiles based on appearance. Site soils were grouped as follows:

- 1) Soils with no obvious signs of hydrocarbon contamination.
- 2) Soils with obvious signs of hydrocarbon contamination.

Information obtained from this test pit screening was considered, along with results of the previous RFI/divestiture investigation soil analyses for this unit, to develop a plan to divide the unit into segments of similar waste types. Preliminary field estimates were that > 2,545 cubic yards of soils were to be excavated from SWMU Z. The excavated soils were staged on 6 mil plastic sheeting and covered with the same sheeting during inclement weather, to prevent runoff from these soils. The soils were excavated and stockpiled as follows:

- **SP1:** Approximately 675 cubic yards of soil which appeared to be uncontaminated fill soil (minor contamination) was removed from the surface to a depth of approximately three feet and placed into three stockpiles, two of which were approximately 300 cubic yards each and one that was 75 cubic yards.
- **SP2:** Approximately 50 cubic yards of soil was determined to have moderate contamination and were placed in a separate pile.

- **SP3:** Approximately 1,800 cubic yards of soil described as black, heavily contaminated soil was segregated into six stockpiles of approximately 500, 200, 275, 275, 275, and 275 cubic yards.
- Approximately 20 cubic yards of concrete blocks were stockpiled for disposal as wastes with minor contamination.

In general, the black stained, hydrocarbon contaminated soils were encountered approximately six feet below grade and were continuous to approximately eleven to twelve feet. Groundwater was encountered in test pits at approximately 12-13 feet, but excavations during remediation were terminated at approximately 12 feet in saturated, visually clean native clay soils at the soil/groundwater interface.

#### **4.2 Soil Verification Samples**

To determine that sufficient removal of soils had occurred to achieve divestiture criteria and thereby determine the limits of the excavation, discrete soil verification samples were collected from the sidewalls of the excavation utilizing the excavator bucket from depths of approximately 2.5 to 5.0 feet and 9 to 11.5 feet. Verification samples were collected from the locations shown in Figure 4-1 and analyzed in accordance with EPA protocol, SW-846, Test Methods for Evaluating Solid Waste. Each verification soil sample was collected from the center of the excavator bucket using a clean trowel, placed in a clean glass jar, appropriately preserved, and shipped to Pace Laboratories in Houston, Texas accompanied by the appropriate chain of custody documentation.

As a demonstration of the low risk to human health and the environment posed by the soil contaminants remaining following the remediation of TPH, at TNRCC's request, and to satisfy the requirements of the disposal facilities, UCC's soil verification sampling was not limited to TPH analyses by GC/MS, but in addition, included analyses of RCRA metals, selected volatile and semi-volatile extractables, including polynuclear aromatic hydrocarbons. The semivolatiles, volatiles, and metals selected for analysis were those which, based on the RFI results from this and other areas and this areas use for managing oily wastes, might be present in this SWMU. The semivolatile analytes were acenaphthene, acenaphthylene, anthracene, benzo(a)pyrene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene, and bis(2-ethylhexyl)phthalate. Volatiles selected for analysis were 4-methyl-2-pentanone, benzene, toluene, ethylbenzene, xylene(s), and acetone. Metals analyzed were arsenic, lead, beryllium, chromium, cobalt, copper, mercury, nickel, silver, and zinc.

The analytical results for TPH in the verification sampling analyses were determined from GC-MS scans for volatile and semivolatile organics. The TPH analyses by GC-MS used gasoline and diesel as calibration standards. Hydrocarbons with the boiling point range of gasoline were quantified from the volatile analysis using  $m/z$  43. Hydrocarbons with the boiling point range of diesel through crude oil (approximately 32 carbons) were quantified from the semivolatile analysis using  $m/z$  57. Mass 57 is representative of hydrocarbons with chain lengths longer than seven carbons. The presence of these masses were integrated across the entire analytical run. Areas for each of the individual hydrocarbon peaks were summed and values for TPH as gasoline or TPH as diesel were calculated relative to diesel and gasoline standards. Utilizing this technique, hydrocarbon based material such as gasoline, diesel, oil and degraded components of diesel, gasoline and oil would be quantified. In addition, the concentrations of the individual Appendix IX volatile and semivolatile constituents of concern were determined with these same GC-MS scans.

Table 4-1 presents a summary of analytical results from the verification sampling of the soils remaining in place. Specific Appendix IX constituents in the residual TPH do not exceed RRR Standard 1 or Standard 2 criteria. No polycyclic aromatic hydrocarbons, which are often associated with TPH, were identified in the verification samples. Residual metal levels (after removal of the soil) fall below the Standard 2 criteria (SAI-Ind or GWP).

The results of the soil verification sampling and statistical evaluation, shown in Table 4-1, indicate sufficient remediation of the TPH contaminated soils to satisfy divestiture and RRR Standard 2 criteria. Table 4-1 presents the TPH data statistically treated according to TNRCC methodology (30 TAC 335.553d.2). Using this method, the concentration of TPH as diesel is statistically estimated at 501 mg/kg, well below the divestiture criteria of 1000 mg/kg.

Laboratory data packages are presented in Appendix C. Also provided in Appendix C are the groundwater analytical results for SWMU Z from the RFI. This RFI groundwater data supplements the verification analyses taken in the side-walls of the excavation. During the RFI, samples from the groundwater indicated no contamination exceeding Standard 2 criteria. During verification sampling, following excavation of TPH for divestiture purposes, no samples were taken in the bottom of the excavation due to encountering groundwater. The RFI groundwater data provided in Appendix C is intended to verify that no significant concentrations of contaminants remain below the SWMU and provide an additional basis for closure of this SWMU under Standard 2. Two sets of RFI groundwater data are presented for MW-7692-4-2. Sample MW 7692-4-2 and MW 7692-101-2 are duplicate samples from a single sampling event.



TABLE 4-1

Summary of Analytical Results for Appendix IX Constituents and TPH  
SWMU Z Verification Sampling of Remaining Soils  
(mg/kg)

Parameter	WW-1-V	WW-2-V	NW-3-V	NW-4-V	NW-5-V	NW-6-V	EW-7-V	EW-8-V	SW-9-V	SW-10-V	SW-11-V	SW-12-V	TPH <sup>1</sup>
TPH as Gasoline (GC/MS)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.07	0.99	2.02	2.17	0.95	<0.5	
TPH as Diesel (GC/MS)	<30	<30	<30	<30	<30	<30	<30	2100	<30	<30	<30	<30	501
Acenaphthene	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
Acenaphthylene	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
Anthracene	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
Benzo(a)pyrene	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
bis(2-Ethylhexyl)phthalate	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	1.4	<0.33	<0.33	0.65	<0.33	
Chrysene	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
Fluoranthene	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
Fluorene	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
2-Methylnaphthalene	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
Naphthalene	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
Phenanthrene	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
< = Less than Method Detection Limit 1 Statistical TPH Calculation for all TPH-Diesel Results													

TABLE 4-1 (Cont'd)  
Summary of Analytical Results for Appendix IX Constituents  
SWMU Z Verification Sampling of Remaining Soils  
(mg/kg)

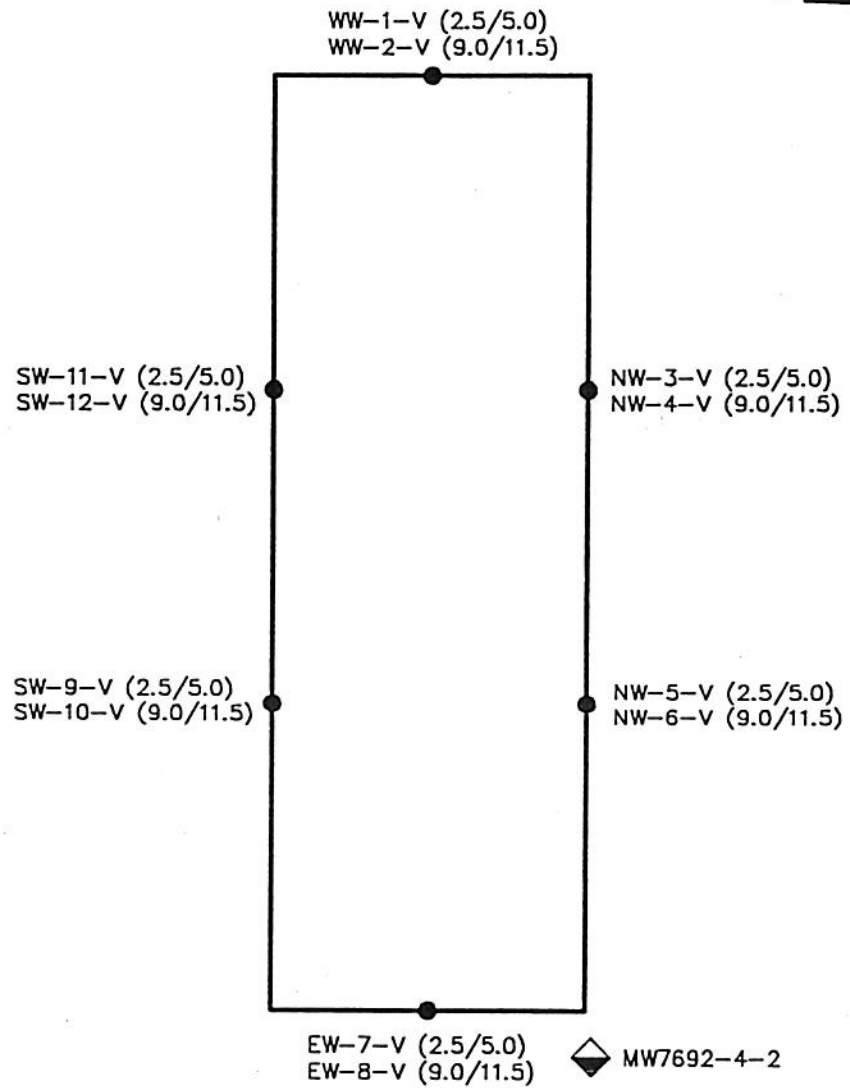
Parameter	WW-1-V	WW-2-V	NW-3-V	NW-4-V	NW-5-V	NW-6-V	EW-7-V	EW-8-V	SW-9-V	SW-10-V	SW-11-V	SW-12-V	TPH <sup>1</sup>
Phenol	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
Pyrene	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
Acetone	<0.010	0.100	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.026	
Benzene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Ethylbenzene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
4-Methyl-2-pentanone	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Toluene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.008	<0.005	<0.005	<0.005	0.008	<0.005	
Xylene (total)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Arsenic	1.0	1.6	2.5	1.3	1.3	4.5	3.5	1.4	0.4	1.2	2.1	5.2	
Lead	6.3	13	12	13	11	8.2	120	9.9	2.8	8.5	17	64	
Beryllium	1.0	1.2	1.2	1.0	0.8	0.8	0.6	0.9	1.1	1.0	0.9	1.3	
Chromium	19	21	21	18	11	9	25	14	20	13	17	21	
Cobalt	8	8	9	9	6	5	9	12	8	7	7	9	
Copper	13	22	16	15	14	12	160	17	50	12	17	14	
< = Less than Method Detection Limit 1 Statistical TPH Calculation for all TPH-Diesel Results													



TABLE 4-1 (Cont'd)

Summary of Analytical Results for Appendix IX Constituents  
SWMU Z Verification Sampling of Remaining Soils  
(mg/kg)

Parameter	WW-1-V	WW-2-V	NW-3-V	NW-4-V	NW-5-V	NW-6-V	EW-7-V	EW-8-V	SW-9-V	SW-10-V	SW-11-V	SW-12-V	TPH <sup>1</sup>
Mercury	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	<0.1	0.2	<0.1	<0.1	<0.1	
Nickel	16	17	18	15	14	10	38	16	21	14	16	18	
Silver	<1	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	<1	
Zinc	58	60	60	53	43	36	310	51	75	53	65	67	
< = Less than Method Detection Limit													
<sup>1</sup> Statistical TPH Calculation for all TPH-Diesel Results													

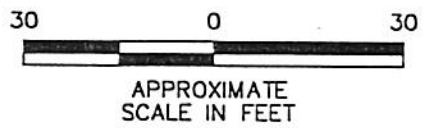


LEGEND

- ◆ - MONITOR WELL LOCATION
- - SAMPLE LOCATION

SW-11-V (2.5/5.0) - SAMPLE ID NUMBER WITH APPROXIMATE DEPTH OF SAMPLE COLLECTION

NOTE: NO SAMPLES WERE COLLECTED FROM FLOOR OF EXCAVATION AS GROUNDWATER WAS ENCOUNTERED AT APPROXIMATELY 12 FT. RFI GROUNDWATER DATA INDICATES THAT GROUNDWATER MEETS STANDARD 2 CRITERIA AT SWMU Z.



**ENSR**<sup>TM</sup>  
ENSR CONSULTING & ENGINEERING

FIGURE 4-1  
SWMU Z  
VERIFICATION SAMPLE LOCATIONS  
UNION CARBIDE CORPORATION  
BROWNSVILLE, TEXAS

DRAWN: SJF	DATE: 10 JUN 94	PROJECT NUMBER:
APPVD:	REVISED: 10 OCT 94	6900-080-391

6900250  
3-28-94

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#### **4.3 Backfill of Excavation**

Following a determination by Mr. R. E. O'Bryan (UCC) that the results of verification sample analyses satisfied the divestiture objective, UCC authorized backfilling of SWMU Z. Backfilling was completed on 01 FEB 94. SWMU Z was backfilled with soil which had been analyzed by UCC, prior to backfilling, for the presence of hazardous constituents. The soil was determined to be suitable for its intended purpose. The results of the backfilled soil analyses are on file at UCC's Brownsville, Texas facility.

## 5.0 WASTE MANAGEMENT

Although the results of the RFI indicated that SWMU Z contained no hazardous waste, additional analyses was required to evaluate the appropriate non-hazardous waste disposal options for the SWMU Z soils. Representative samples were collected from stockpiled SWMU Z soils and analyzed for waste classification purposes. Composite soil samples were analyzed for metals, semi-volatiles, and volatiles by the Toxicity Characteristic Leaching Procedure (TCLP), and total petroleum hydrocarbons (TPH) by IR. Grab samples of soil were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) per state requirements for disposal. Pesticides and herbicides were not analyzed. Based on the results of these analyses, UCC classified the relatively clean soils removed from the upper three feet of SWMU Z piles SP1-SP2, as Class II (Nonhazardous) Industrial Solid Waste. The black stained soils pile SP-3, were classified as Class I (Nonhazardous) Industrial Solid Waste. The results of these classification analyses are presented in Tables 5-1 and 5-2. Table 5-1 provides the pertinent TNRCC Waste Disposal MCLs and the EPA TCLP limits. The laboratory data packages for these results are presented in Appendix D. TPH in soils was evaluated for waste disposal by EPA Method 418.1 (IR) as required by the TNRCC. Samples whose results are summarized in Table 5-1 and 5-2 were either grabs or composites as required by the TNRCC regulations or disposal facility requirements. Grabs were taken for BTEX samples in Table 5-2 to meet those requirements.

Waste manifests indicate that 1,122 cubic yards of soils from SP-1 and SP-2 were disposed of as Class II Nonhazardous Industrial Solid Waste. Twenty-two cubic yards of contaminated soils were disposed of as Class I (Nonhazardous) Industrial Solid Waste at Browning-Ferris Industries in Sinton, Texas, because they exceeded Class II TPH standards but meet Class I standards for the Sinton Landfill. According to waste manifest records 1,578 cubic yards of the SWMU Z soils exceeded the BFI's Sinton landfill acceptance limit of 5,000 mg/kg of TPH (IR) and were disposed of as Class I (Nonhazardous) Industrial Solid Waste at Texas Ecologists in Robstown, Texas. Copies of the TNRCC manifests documenting these waste shipments have been provided to the TNRCC in both Austin and the District 15 Office.

TABLE 5-1  
Results of SWMU Z TCLP Waste Disposal Analyses for  
SP1-SP2 Soils (from 0-3 feet) and  
SP3 Soils (from > 3 feet)

	SP1-SP2-W (mg/l)	SP3-A1-W (mg/l)	SP3-A2-W (mg/l)	SP3-B1-W (mg/l)	SP3-C1-W (mg/l)	SP3-D1-W (mg/l)	SP3-E1-W (mg/l)	SP3-F1-W (mg/l)	Maximum Concentration for Toxicity Characteristic (mg/l)	31 TAC 335, 501-515 Appendix 1, Table 1 MCLs (mg/l)
TCLP Metals:										
Arsenic	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5.0	1.8
Barium	0.6	1.3	0.9	1.1	1.0	1.3	1.3	1.0	100	100
Cadmium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	1	0.5
Chromium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5.0	5.0
Lead	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5.0	1.5
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5.0	5.0
Selenium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.0	1.0
Mercury	0.0010	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.2	0.2
TCLP Semivolatiles:										
1,4-Dichlorobenzene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	7.5	7.5
2,4,5-Trichlorophenol	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	400.0	400.0
2,4,6-Trichlorophenol	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	2.0	2.0
2,4-Dinitrotoluene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.13	0.13
Hexachlorobenzene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.13	0.13



TABLE 5-1 (Cont'd)  
Results of SWMU Z TCLP Waste Disposal Analyses for  
SP1-SP2 Soils (from 0-3 feet) and  
SP3 Soils (from >3 feet)

	SP1-SP2-W (mg/l)	SP3-A1-W (mg/l)	SP3-A2-W (mg/l)	SP3-B1-W (mg/l)	SP3-C1-W (mg/l)	SP3-D1-W (mg/l)	SP3-E1-W (mg/l)	SP3-F1-W (mg/l)	Maximum Concentration for Toxicity Characteristic (mg/l)	31 TAC 335, 501-515 Appendix 1, Table 1 MCLs (mg/l)
Hexachlorobutadiene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.5	0.4
Hexachloroethane	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	3.0	3.0
Nitrobenzene	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	2.0	2.0
Pentachlorophenol	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	100	100
Pyridine	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	5.0	4
m-Cresol	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	200	200
o-Cresol	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	200	200
p-Cresol	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	200	200
TCLP Volatiles										
1,1-Dichloroethylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.7	0.6
1,2-Dichloroethane	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.5	0.50
Benzene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.5	0.50
Carbon Tetrachloride	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.5	0.50
Chlorobenzene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	100	70
Chloroform	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	6.0	6.0
Methyl Ethyl Ketone	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	200	200
Tetrachloroethylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.7	0.7



TABLE 5-1 (Cont'd)  
Results of SWMU Z TCLP Waste Disposal Analyses for  
SP1-SP2 Soils (from 0-3 feet) and  
SP3 Soils (from > 3 feet)

	SP1-SP2-W (mg/l)	SP3-A1-W (mg/l)	SP3-A2-W (mg/l)	SP3-B1-W (mg/l)	SP3-C1-W (mg/l)	SP3-D1-W (mg/l)	SP3-E1-W (mg/l)	SP3-F1-W (mg/l)	Maximum Concentration for Toxicity Characteristic (mg/l)	31 TAC 335, 501-515 Appendix 1, Table 1 MCLs (mg/l)
Trichloroethylene	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.5	0.5
Vinyl Chloride	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.2	0.2
< = less than method detection limit										

TABLE 5-2

Results of SWMU Z Waste Characterization Analyses for  
TPH (IR) and BTEX Constituents

Sample ID	TPH (IR) (mg/kg)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	m-Xylene (mg/kg)	o-Xylene (mg/kg)	p-Xylene (mg/kg)
SP1-A1	130	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
SP1-B1	260	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
SP1-C1	370	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
SP2-A1	240	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
SP1-A2	210	-	-	-	-	-	-
SP1-A3	230	-	-	-	-	-	-
SP1-B2	190	-	-	-	-	-	-
SP1-B3	290	-	-	-	-	-	-
SP1-C2	390	-	-	-	-	-	-
SP2-A2	550	-	-	-	-	-	-
SP3-1F1	2,100	-	-	-	-	-	-
SP3-1	5,475	-	-	-	-	-	-
SP3-2	3,113	-	-	-	-	-	-
SP3-3	2,712	-	-	-	-	-	-
SP3-4	520	-	-	-	-	-	-
SP3-5	1,825	-	-	-	-	-	-
- Not tested.							
< = less than method detection limit							

TABLE 5-2 (Cont'd)  
Results of SWMU Z Waste Characterization Analyses for  
TPH (IR) and BTEX Constituents

Sample ID	TPH (IR) (mg/kg)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	m-Xylene (mg/kg)	o-Xylene (mg/kg)	p-Xylene (mg/kg)
SP3-6	7,175	-	-	-	-	-	-
SP3-7	218	-	-	-	-	-	-
SP3-8	405	-	-	-	-	-	-
SP3-9	670	-	-	-	-	-	-
SP3-10	3,133	-	-	-	-	-	-
SP3-11A	128	-	-	-	-	-	-
SP3-12	1,235	-	-	-	-	-	-
SP3-13	14,158	<0.5	0.89	<0.5	0.69	1.67	0.57
SP3-14	9,641	-	-	-	-	-	-
SP3-15	3,408	-	-	-	-	-	-
SP3-16	435	-	-	-	-	-	-
SP3-17	15,000	0.68	1.50	0.60	2.21	2.36	0.63
SP3-18	156	-	-	-	-	-	-
SP3-19A	208	-	-	-	-	-	-
SP3-20	12,361	0.93	1.15	0.68	0.91	1.89	0.78
SP3-21	1,075	-	-	-	-	-	-
SP3-22	7,033	-	-	-	-	-	-
- Not tested. < = less than method detection limit							

TABLE 5-2 (Cont'd)  
Results of SWMU Z Waste Characterization Analyses for  
TPH (IR) and BTEX Constituents

Sample ID	TPH (IR) (mg/kg)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	m-Xylene (mg/kg)	o-Xylene (mg/kg)	p-Xylene (mg/kg)
SP3-23	3,167	-	-	-	-	-	-
SP3-24	3,683	-	-	-	-	-	-
SP3-25A	5,417	-	-	-	-	-	-
SP3-26	4,800	-	-	-	-	-	-
SP3-27	24,833	<0.5	<0.5	<0.5	<0.5	0.77	0.97
SP3-28	33,417	0.50	<0.5	<0.5	<0.5	1.14	<0.5
SP3-29	18,417	1.78	8.20	1.24	7.54	12.12	3.49
SP3-30	4,350	-	-	-	-	-	-
SP3-31	14,917	0.54	1.08	<0.5	1.34	1.02	0.42
SP3-32	594	-	-	-	-	-	-
SP3-33	1,970	-	-	-	-	-	-
SP3-34	1,645	-	-	-	-	-	-
SP3-35	585	-	-	-	-	-	-
SP3-36	1,990	-	-	-	-	-	-
SP3-11B	154	-	-	-	-	-	-
SP3-19B	78	-	-	-	-	-	-
SP3-25B	28,194	0.86	5.45	1.27	5.31	9.93	3.00

- Not tested.  
< - less than method detection limit



## 6.0 DEED CERTIFICATION

In accordance with 30 TAC §335.560, UCC will provide the appropriate deed certification information to the Brownsville Navigation District to be placed in the deed records of Cameron County. Proof of filing of the deed certification shall be provided to the Executive Director in writing no later than 90 days after TNRCC acceptance of this Corrective Measures Implementation Report. An example of the deed certification is provided in Appendix E. The deed certification example includes a list (Table E-1) of the known waste constituents left in place and their concentrations (maximum and average) as well as the Notice of Registration and the site survey and metes and bounds description. Table E-1 also presents the Standard 2 Criteria for those constituents. The criteria were taken from the values in the Risk Reduction Rule (28 JUN 93) tables when available or were generated using Risk Reduction Rules methods and factors developed from various databases such as IRIS or HEAST or other appropriate sources. GWP values were adjusted for groundwater TDS greater than 10,000 mg/l. The details of the development of these criteria are presented in the RFI Workplan submitted to the TNRCC on 30 JUL 93.

## 7.0 CONCLUSIONS

Following the remediation of SWMU Z, achievement of UCC's internal divestiture criterion for TPH has been demonstrated by soil verification results using TPH analyses (GC/MS) of the remaining soils.

On the basis of information in the RFI Workplan, submitted to the TNRCC 30 JUL 93, and additional information presented in this Corrective Measures Implementation Report UCC concludes that the soils in SWMU Z meet Risk Reduction Rules Standard 2 adjusted criteria in accordance with 30 TAC 335, Subchapter S. Deed certification (as provided in Appendix E) is required in accordance with 30 TAC §335.560 (b)(1-4) and will be filed by the facility owner, Brownsville Navigation District, within 90 days of the TNRCC's acceptance of this Corrective Measures Implementation report.

This report describes the results of UCC's remedial investigation to correct the environmental impacts or remediate the presence of a nonhazardous waste involving or affecting the divestiture of the subject property.



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**REFERENCES CITED**

30 Texas Administrative Code, Texas Register, Chapter 335, Subchapter S, 28 JUN 93.

Corrective Measures Implementation Workplan for SWMU Z, "Old Oil Skimmer Pits," Union Carbide Corporation, 01 APR 94.

RCRA Facility Investigation Workplan, Union Carbide Chemicals and Plastics Company, Brownsville, Texas Volumes I - IV, 30 JUL 93.